United States Patent [19]

D'Angelo

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[54] **DYNAMOMETER**

[75] Inventor: Severino D'Angelo, Laguna Beach, Calif.

[73] Assignee: Horiba Instruments Incorporated, Irvine, Calif.

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[58] Field of Search .... 73/117, 133 R, 134, 73/861.18

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Primary Examiner—Charles A. Ruehl
Attorney, Agent, or Firm—Harness, Dickey & Pierce

[57] **ABSTRACT**

A dynamometer system for simulating road load and vehicle inertia forces for testing vehicles in place. The system includes a DC motor power absorption unit (PAU) and a microcomputer based system controller for controlling both the road load and inertia forces simulated by the PAU. A non-declutchable flywheel is used to simulate mechanically a constant amount of inertia to minimize the power requirements of the PAU. The control scheme is designed to implement the classic dynamometer control expression ($F = A + Bv + Cv^2 + I\, dv/dt$) in a novel manner with a minimum amount of delay time. The microcomputer is provided with the following measured functions: speed, acceleration, and a torque signal. The total force output to be simulated by the PAU is determined by first calculating the actual force output of the vehicle, and then determining the percentage of the total force output that should be assigned to the PAU. In calculating the total force output of the vehicle, the inertia outside the torque loop is accurately accounted for, thus permitting the torque transducer to be placed adjacent the PAU. In addition, the force output control signal applied to the PAU is corrected by an inertia error function to insure that the actual inertia force simulated by the PAU corresponds to the desired inertia value. A novel method of accurately converting the frequency signal from the speed sensor to a parallel digital signal without introducing an excessive time delay is also disclosed.

14 Claims, 10 Drawing Figures